

# THE PSYCHOLOGICAL BULLETIN

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## GENERAL REVIEWS AND SUMMARIES

### VOLITION AND MOTOR CONSCIOUSNESS—THEORY

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The papers here brought together deal with several different phases of the problem of volition: (1) The extent to which movement or action can be regarded as a factor in human consciousness; (2) the nature of the immediate antecedents of voluntary action; (3) the question as to the highest type of action; and (4) the problem of human freedom.

1. With the growing emphasis in recent thought on the active, functional and pragmatic, it is to be expected that in psychology this movement would appear in the form of an attempt to understand all consciousness in motor terms. Accordingly, Kostyleff (10) believes that consciousness is connected with the motor rather than the sensory side of the organism, and advances a dynamic conception based on the functional development of reflexes as opposed to the current view that mental states are directly due to inflowing currents or to revivals of these. Pradines (14) also claims that action is the whole of life, and is free and undetermined, as is all reality. Knowledge is nothing but a form of action, which has come to forget its own nature. Alexander (1) makes a systematic attempt to sketch a complete conational psychology. The objects of contemplation are non-mental. Conation, the act of contemplating or "enjoying," alone is mental, with feeling as one of its modalities. Psychology must describe all forms of consciousness as a series of conative acts, show their relation to their non-mental *cognita*, and make clear how they assume a speculative as well as a practical form. Dearborn (4) is more conservative, re-

taining more of the older views. As a coördinator and integrator, the central nervous system is the basis of consciousness. But muscle constitutes about half the mass of the organism; in subtlety of metabolism and intricacy of structure, in chemical activity and in the molar activities of its ceaseless tonal and occasional contraction, it is not surpassed by any of the tissues. It might well itself serve as a physical basis for consciousness. At any rate, either directly, or indirectly through kinæsthetic sensations, it is the source of the energy in the stream of consciousness and subconsciousness. Pillsbury (13) opposes the attempt to reinstate the innervation sense without new proof, holding to kinæsthetic sensations in their place. He agrees with the motor theory in emphasizing the part played by kinæsthetic qualities in every domain, but will not agree to a motor origin for all the qualities of perception, memory, selection, meaning, etc., nor accept movement as the cause of any of the antecedent conscious states. Both sensation and movement are needed for the explanation of any phase of consciousness.

2. Rowe (15) gives an extensive review of experimental and pathological literature, and opposes feeling as the initiator of voluntary movement. Feeling may inhibit or reinforce, but so long as it dominates, there is no volition. A perceptual or ideational process is essential for the initiation of a voluntary movement and involves a control based on immediate sensations and perceptions of results, of a kinæsthetic, visual or auditory nature. Bernard (3), arguing for a unitary as against an individualistic, utilitarian and hedonistic view of society, and for its scientific analysis and control, devotes two chapters to these psychological problems. The cause of an act is not feeling alone, nor ideation alone, nor even always either of these; it consists rather, as Woodworth maintains, in the total set of the nervous system at the moment, which is itself determined by numerous factors, some conscious and some unconscious. Dearborn (5, 6) also holds that every deliberate movement is the resultant of influences coming from every part of the brain or even of the entire gray fabric of the nervous system.

3. MacDougall (11) says that the system of habits gives to ideal activity its point of origin and its direction; the system of ideas gives to habit a telic value. Normal development tends towards a more complex synthesis of habit-modes and a widened ideal horizon. The highest type of self is that in which a life of the most intense intellectual activity finds its basis and its object in the fullest

organization of experience in terms of significant reactions of the will. Stocks (16) distinguishes between motive and intention. The former "is that characteristic tendency or disposition of a man in virtue of which a given act possesses an attraction for him." It is not mere feeling, is largely unconscious, and is best defined by reference to end. Intention is what is consciously present to the agent at the moment of action. The imperfectly developed character betrays in action a number of dimly apprehended and chaotic purposes. The perfect will is one in which there is no motive other than intention. Barrett (2) makes an experimental study on which he bases the following conclusions: "When a choice has to be made between two alternatives, the choice is quick and easy in proportion as the values of the alternatives are clearly and definitely known." To choose well, therefore, "we must clearly and definitely determine the values of alternatives, and that of course, as far as possible, long before the choice begins." And the "top-value" of our scale, with which nothing whatever is comparable, "must act as a charm, it must electrify us, hypnotize us." Bernard (3) has as the main thesis of his sociological study mentioned above the following: "Individuals have no liberties in opposition to a scientifically controlled society. . . . The really social individual is not one who acts with individual reference. . . . He attempts to discover the conditions of the most effective social life and then to bring these conditions about and to adjust himself to them."

4. The problem of freedom is incidentally touched upon by more than one of the authors already mentioned. Pradines (14) speaks of action as free and undetermined. Barrett (2) thinks that indirectly his study shows the worthlessness of the psychological arguments for determinism. Several are clearly written from a deterministic standpoint. Our four remaining references deal with this problem specifically. Kohnstamm (9) is the only determinist among them. He finds the scientific explanation of freedom not in the exclusion of effective causality, but in a causally determined choosing among several open possibilities. But the significance of free choice as thus defined lies not in its cause but in its end. For Field (7) it is inconceivable that our own inner experience as to the nature of the relation between motive and act could deceive us. Any attempt to describe the relation must be in terms of something not active, and so be untrue. It is indescribable, unanalyzable, because unique and singular, and this is what we mean by "free."

Horne (8) and Palmer (12) both attempt a new defense of the

libertarian position. Both define it in terms of a genuinely ambiguous future, determinable by our purposes, which themselves can never be wholly accounted for by sequential causation (12, p. 126). Palmer frankly accepts the implication of genuine chance in the universe, and admits that the existence of sin and the nature of the influence of thought on matter remain insoluble mysteries. Both authors use the conventional arguments, admit that these do not constitute final proof, and regard freedom as very limited. For both, the series of temporal phenomena cannot be explained exclusively in terms of efficient causes (which Palmer happily calls sequential), but wherever purposes exist involves also final (antesequential) causes; and thus, in their view, the world remains wholly causal and law-abiding. Both claim that their conception is not identical with a freedom of indifference, and Palmer says that it is not indeterministic (p. 186). Horne's work is marred by numerous misconceptions. He always confuses determinism with many things that it is not,—fatalism, predestination, necessarianism, subjection to custom and authority,—and is thus led to reverse the historical course of thought, believing it to be away from earlier determinism toward a growing belief in indeterministic freedom. He assumes that to establish a psychical cause for physical phenomena would prove libertarianism (pp. 103, 108), and that to deny interactionism is to deny efficiency for mind (pp. 83, 87, 99). He understands the mechanical theory of the universe to mean the transformation of energy only downwards (pp. 110, 114); asserts that the physical causal law claims only that every cause has an effect, not that also every cause has a cause (p. 135); takes transcendental to mean the initiation of a new causal series in the temporal order (p. 53), and thus is led to place Kant and Royce among the libertarians. Palmer understands determinism better; but he is forced to believe what a scientist can hardly concede, namely, that the world is split into numberless independent lines of sequential causality and that harmonious correspondences between these can be the result only of chance or of antesequential causation (pp. 136–150). Finally, Horne does not mention and Palmer does not adequately discuss the form of determinism which holds that sequential mechanism and antesequential teleology are compatible, that the whole world may be exhaustively explained in terms of cause but also in terms of purpose, and that the human will may be as free transcendently as empirically it is without limitation sequentially causal.

## REFERENCES

1. ALEXANDER, S. Foundations and Sketch Plan of a Conational Psychology. *Brit. J. of Psychol.*, 1911, 4, 239-267.
2. BARRETT, E. B. *Motive Force and Motivation-tracks*. London: Longmans, Green & Co., 1911. Pp. xiv + 225.
3. BERNARD, L. L. *The Transition to an Objective Standard of Social Control*. Univ. of Chicago Press, 1911. Pp. 96.
4. DEARBORN, G. V. N. The Relation of Muscular Activity to the Mental Process. Reprinted from *Amer. Physical Educ. Rev.*, 1909, 14. Pp. 8.
5. DEARBORN, G. V. N. The Nerve-Mechanism of Voluntary Movement. Reprinted from *Amer. Physical Educ. Rev.*, May, 1912. Pp. 12.
6. DEARBORN, G. V. N. Notes on the Neurology of Voluntary Movement. Reprinted from *Medical Record*, May 18, 1912. Pp. 48.
7. FIELD, G. C. The Meaning of Human Freedom. *Mind*, 1911, 20, 379-393.
8. HORNE, H. H. *Free Will and Human Responsibility*. New York: Macmillan, 1912. Pp. xvi + 197.
9. KOHNSTAMM, O. Willensfreiheit und Zielstrebigkeit. *J. f. Psych. u. Neur.*, 1911, 18, 87-101.
10. KOSTYLEFF, N. *La crise de la psychologie expérimentale*. Paris: Alcan, 1911. Pp. 176.
11. MACDOUGALL, R. The System of Habits and the System of Ideas. *PSYCHOL. REV.*, 1911, 18, 324-335.
12. PALMER, G. H. *The Problem of Freedom*. Boston: Houghton Mifflin Co., 1911. Pp. ix + 211.
13. PILLSBURY, W. B. The Place of Movement in Consciousness. *PSYCHOL. REV.*, 1911, 18, 83-99.
14. PRADINES, M. *Critique des conditions de l'action*. Paris: Alcan, 1909. 2 vols. Pp. viii + 702; ii + 305.
15. ROWE, E. C. Voluntary Movement. *Amer. J. of Psychol.*, 1910, 21, 513-562.
16. STOCKS, J. L. Motive. *Mind*, 1911, 20, 54-66.

## REFLEX ACTION

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In the regular experiments with decerebrate preparations, stimulation of the afferent nerve produces inhibition of the contraction in progress. Sherrington (4) reports that this phenomenon may be reversed in the following ways. A constant weak galvanic current produces the regular inhibition at the make and break, but during the action of the stimulus gives a contraction myogram. Repeated, brief galvanic currents, each of about .04 second in length and at the rate of 12 per second, cause contraction. Weak faradic currents give weak but noticeable contraction phenomena. The weak galvanic current broken at the rate of 20 times per



second by the v. Kries rotating rheonome gives a steady, lasting contraction. Beside these changes in the intensity and form of the current, to produce the reversal of action, the muscle must also retain its tonic condition, *i. e.*, there must be entire absence of "shock." When these conditions are observed, especially with the last form of stimulation mentioned above, the contractions are closely comparable to real tonic reflexes. Some 18 seconds after this contraction had been produced, stimulation with a faradic current in the regular way gave the usual reflex inhibition. The action of the stimulation with the rotating rheonome in circuit seems to indicate that the "natural" tonic phenomenon is also produced by rhythmic and intermittent stimuli from the receptors. In a further investigation of reflex inhibition, Sherrington (3) used an artificial stimulus (background stimulation of the ipsilateral nerve) to obtain the reflex contraction of the knee flexor muscles in the cat. The stimulation of the contralateral afferent, while the contraction was still in progress, generally produced an inhibition of this reflex contraction. In certain weak stimulations of the inhibiting nerves, increased contraction is noted followed by the usual inhibitory effect. "Fatigue of the background reflex seems to favor markedly the operation of inhibition against the reflex." Rebound occurs when the inhibiting stimulus is removed, not only when the background stimulation is artificial, but also when it is a "natural" reflex, as pinching the pinna of the ear, or when the origin of the contraction is not clear. Whether reflex contraction or inhibition ensues depends upon the intensity of the reflex background as well as on the intensity of the second stimulation.

Pike (2) argues that the truth "concerning the conflicting views regarding the nature of 'spinal shock' will doubtless be found in the study of the phylogenetic and ontogenetic development, functional as well as morphological, of the central nervous system." He contributes evidence to show that "the collapse of the animal during the resuscitation period is due to the fact that the bulbar vasomotor mechanism can no longer produce any rise in [blood] pressure by a constriction of peripheral vessels after interruption of the efferent nerve channels. Occlusion of the head arteries and transection of the cord soon thereafter produced *a series of collapses*. The first collapse did not occur immediately, hence it seems improbable that the "hypothetical shock" is due to a loss of tonus impulses from above, nor does it appear probable that the secondary collapses are produced by later stimulation of efferent inhibitory

fibers, since no fall in blood pressure is noted. The assumption of a fairly definitely localized bulbar vasomotor mechanism seems to him the simplest explanation of the observed facts.

By means of the "artificial perfusion of an organ, in this case the spleen, which is completely severed from the natural circulation, by cutting or ligating all its blood vessels, but which is still left in connection with the vasomotor center of the animal," Sollmann and Pilcher (5) investigated the reactions of the vasomotor center. Both peripheral actions and the variations in blood supply from cardiac disturbances being excluded, the experiment consists in interrupting the stream of oxygen. The center is thus stimulated by asphyxia. They find that the fall in blood pressure is due to cardiac influences rather than to central vasomotor paralysis. "The results are the same whether the vagi are intact or divided." They find that sudden arrest of the heart also causes a marked stimulation of the vasomotor center. This stimulation by asphyxia does "not occur if the accumulation of carbon dioxide is prevented."

Lowsley (1) studied the relation between changes in blood pressure and all forms of exercise in athletes. He finds a rise in systolic, diastolic, and pulse pressure after all exercise. Moderate exercise causes about one-half the rise in diastolic pressure noted in other types of exertion. All the pressures fall below normal soon after the close of exercise. The pulse rate exhibits similar changes, except that it falls below normal in only four cases out of sixty. Exercise may probably be considered within hygienic limits when the subnormal phase disappears before the lapse of sixty minutes. A delay beyond one hundred and twenty minutes, as occurred after the more violent forms of exercise, appears to indicate dangerous over-straining.

1. LOWSLEY, O. S. The Effects of Various Forms of Exercise on Systolic, Diastolic and Pulse Pressures and Pulse Rate. *Amer. J. of Physiol.*, 1911, 27, 446-466.
2. PIKE, F. H. Studies in the Physiology of the Central Nervous System.—II. The Effect of Repeated Injuries to the Spinal Cord During Spinal Shock. *Amer. J. of Physiol.*, 1912, 30, 436-450.
3. SHERRINGTON, C. S., & SOWTON, S. C. M. On Reflex Inhibition of the Knee Flexor. *Proc. Roy. Soc.*, 1911, B 84, 201-214.
4. SHERRINGTON, C. S., & SOWTON, S. C. M. Reversal of the Reflex Effect of an Afferent Nerve by Altering the Character of the Electrical Stimulus Applied. *Proc. Roy. Soc.*, 1911, B 83, 435-446.
5. SOLLMANN, T., & PILCHER, V. D. The Reaction of the Vasomotor Center to Asphyxia. *Amer. J. of Physiol.*, 1911, 29, 100-107.

## FATIGUE

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A valuable study and criticism of methods for dealing with the work-curve is contributed by Thorndike (5), but in so concentrated a form that one can here do little more than indicate the many phases of the problem it discusses. The work-curves of a previously published (and here reviewed) series of multiplication tests and a later series of addition experiments are studied to test the interpretations which previous investigators have put upon different real or supposititious features of the work-curve. On the whole they seem to belong mainly in the latter class; initial spurt, end-spurt, warming up, adaptation. A feature of von Voss's work on the temporal variation in mental capacity is severely handled. Fatigue is defined as that diminution in efficiency *which rest can cure*. The effects noted are very slight indeed, in accordance with the author's previous work; and its disagreement with other conclusions is elucidated. Another point is the superiority of intermittent practice over continuous practice of the same working time. The curve of mental work is actually very near a line both straight and horizontal. The feelings of fatigue are important, but these tend toward a stoppage of the work, and when this response is excluded, habit maintains the standard of speed and accuracy. In closing, a number of defects in the Kraepelinian analysis are enumerated, six in all, but the author considers that any attempt at speculative analysis could scarcely avoid similar pitfalls, well remarking that in the present state of knowledge it is far better to analyze a work-curve by experiment than by deduction, which, in passing, is not true of the work-curve alone, among present psychological problems.

Winch (7) reports a study of the effect of school hours upon performance in arithmetical problems, along the same lines as his work on the value of the night school, previously reviewed in these columns. Four series of experiments were made, two in boys' schools, and one in girls' and infants' schools, all in surroundings below the average social standing. The number of subjects in each series ranged between 49 and 60. As in the previous research, preliminary tests in the functions to be measured were given, by means of which the two "equal groups" were arranged. One group would then work at arithmetical problems early in the morning, while the others



were given the same problems in the late afternoon. Any lowering in efficiency due to the work of the school day would be shown in a decreased ability of the otherwise equal afternoon group. Both groups may be expected to improve on the records of the preliminary tests, so that the results are presented in terms of the per cent. of this improvement, showing the difference in this respect between the morning and afternoon work. In the infants' school however (ages 6-7) the afternoon work showed no improvement over the preliminary records, seeming accordingly to the author useless; the morning work showed over 12 per cent. of improvement. In two experiments with boys and girls respectively, the ages being about 11 years, the averages of both morning and afternoon work improved on the preliminary records, but the excess of improvement in the morning work was some 7 per cent. The fourth series, in a boys' school with subjects of about 13 years, showed rather slight improvement of both groups over the preliminary tests, but the excess of the morning over the afternoon work was about 3 per cent. The author concludes by remarking that the results are in general accord with the opinions prevailing in the best current pedagogy; the fatigue effects are very much lessened as the children rise in age and mental capacity.

Ritter (4) describes a series of experiments with school children by a method in which he expresses considerable confidence, a *Dictierverfahren* adapted from Ebbinghaus, involving essentially a memory process. There is a considerable review of other educationally used methods also. The experiments regularly show an increase in the number of errors with progressive school work, and according to the special conditions a number of inferences regarding school economy are drawn. The conduct of a summer *Ausflug* afforded an opportunity to test the performance in relation to physical fatigue. It did not seem to be especially affected thereby.

Two interesting studies of the industrial bearings of the fatigue problem are contributed by Bogardus (1). Its phases are enumerated by him as (a) the relation of fatigue to industrial accidents, (b) fatigue and industrial inefficiency, (c) fatigue and susceptibility to contagious diseases, (d) fatigue and nervous diseases, (e) fatigue and future generations, (f) fatigue and morals of working people. The present articles deal with the first of these; how does modern industrial labor affect the normal development of fatigue, and what are the observable circumstances under which these processes result in accidents? Can the subjective fatigue process be measured by

means of controlled experiments in terms comparable to the observable conditions preceding accidents, and thus be causally related to them? A brief account is given of the physiological chemistry of fatigue, and it is brought out that an important feature of it is to diminish the accuracy of motor coördinations, whose relation to accident is obvious. The writer's observations are that these are characteristic of the phenomena immediately preceding industrial accidents. Monotony resulting from the specialization of tasks is emphasized. Then too, the tension under which work is done diminishes the feeling of fatigue, increasing the liability to exhaustion. Some figures of excessive work periods are given. Two thousand six hundred and seventy-eight accidents are analyzed as due to causes beyond the control of the injured, or to faulty reactions on their part. There seems to be a misprint making a discrepancy in the presentation, but it appears that 2,203 or 82 per cent. of these involved fatigue as a causal factor. A series of experiments was conducted in a laboratory at Chicago University, in which the operation of machinery at a dangerous trade was simulated as closely as practicable, showing a score of errors doubled for the second half of a fifteen-minute experiment over that of the first half. Speeding up increased the disparity. The individual differences are referred to a temperamental basis.

Despite the promise of the "*Beeinflussung einfacher psychischer Vorgänge*," and the further emphasis laid by Kraepelin on its problems under the concept of the *künstliche Geistesstörung*, the experimental psychology of drugs has not proved a field attractive to most investigators. Hoch and Kraepelin observed the effects of the tea-constituents. Haenel also, and Loewald, directly under Kraepelin's influence, made special studies of trional and bromide respectively, besides which there are the researches of Rivers, Rüdin and others on alcohol. Experiments upon single mental functions with various drugs have also been reported. But the necessary conditions for such experiments are not easy for the ordinary laboratory to meet, and, it is possible that they have never been so adequately met as in the study by Hollingworth (2) of the influence of caffeine upon various mental and bodily activities. The circumstances of the work were unusual and occasion the appearance in the book of some matter that is absent in the usual presentation of research; yet the immediately satisfactory result of the work may well lead to other similar applications, to the proper external precautions in which the present volume should be a useful guide. A

general series of experiments was performed with small, medium and large doses of caffein. Neither experimenter nor subject knew whether the dose was of caffein or a control. The general result of the experiments is that of stimulation without secondary depression, confirmatory to the previous conclusion of Rivers.<sup>1</sup> An extended account is given of the amount and character of sleep as well as of the general health of the subjects during the experiment. There is a uniform gain in health owing probably to the regular living occasioned by the experimental conditions. After larger doses (4 gr. and over), "nervousness," dizziness and headache, with disturbed sleep, were apt to follow. Increased constitutional susceptibility appears to be rather a function of body weight than other factors, and the effect also depends upon the presence of food in the stomach. No *Abstinenzerscheinungen* seem to have occurred where they might have been expected. The experiments are generally evaluated in such a way as to express efficiency in the whole test, so that they do not measure the influence of caffein on fatiguability, but indicate that it would serve to arrest the fall of the work-curve in most of the functions tested.

Apropos of the work of this author here cited last year, may be mentioned Weber's (6) reply to a criticism of his book by Leschke,<sup>2</sup> that the former fails to make proper use of introspection in his results, and publishes selected curves without a statement of the number of cases in which the characteristic changes did not take place. Weber replies in the first instance that the use of hypnotic suggestion, by an operator acquainted with his subject, obviates the necessity of introspective accounts. In the second, he replies essentially that the exclusion of the negative records was justified on the ground of intercurrent accidents which obscured their interpretation. Leschke (3) declines to regard these explanations as satisfactory.

On the whole, the attack upon the problem of fatigue from the psychological side might on the surface appear somewhat disorganized. Instead of the coördinate investigations that came from Kraepelin's laboratory, and the work that centered about the æsthesiometric method and the ergograph, researches now take on the form of studying a very specialized situation by such method or methods as are specifically adapted to it. This indeed is as it should be, for the problem is a complex if not also a compound one;

<sup>1</sup> For a tabulated statement of experiments and results see p. 422.

<sup>2</sup> *Arch. f. d. ges. Psychol.*, 1911, 21, 435-463.

we may regret the difficulty, but not the fact that we are learning better to recognize and deal with it. Fatiguability can be measured more satisfactorily in some functions than in others. In one of these we may yet find a measure of fairly general application, or it may be that the search for the "measure of fatigue" is wholly a Ponce de Leon's quest; but the specific educational and hygienic problems in the economy of effort and the safeguarding of our energies the above researches have placed us in a distinctly better position to encounter.

## REFERENCES

1. BOGARDUS, E. S. The Relation of Fatigue to Industrial Accidents. *Amer. J. of Sociol.*, 1911, 17, 206-222; 351-374.
2. HOLLINGWORTH, H. L. The Influence of Caffein on Mental and Motor Efficiency. *Arch. of Psychol.*, No. 22, 1912. Pp. 166.
3. LESCHKE, E. Erwiderung, etc. *Arch. f. d. ges. Psychol.*, 1911, 21, 581.
4. RITTER, C. Ueber Ermüdungsmessungen. *Zsch. f. angew. Psychol.*, 1911, 4, 495-545.
5. THORNDIKE, E. L. The Curve of Work. *PSYCHOL. REV.*, 1912, 19, 165-194.
6. WEBER, E. Bemerkungen zu der Abhandlung, Die Körperl. Begleiterscheinungen seelischer Vorgänge. *Arch. f. d. ges. Psychol.*, 1911, 21, 579-580.
7. WINCH, W. H. Mental Fatigue in Day-school Children, as measured by Arithmetical Reasoning. *Brit. J. of Psychol.*, 1911, 4, 315-341.

## PSYCHOLOGICAL ASPECTS OF DRUG ACTION

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Very little of the past year's work on the influence of drugs has any particular psychological interest. Several symposiums on anæsthetics have dwelt chiefly on the practical aspects of the topic. Hirschel (2) sketches the development of the use of local anæsthetics (suprarenin, cocain, novocain). Short and Salisbury (13) have demonstrated that none of the commonly used drugs for superficial application (belladonna, atropine, aconite, opium, chloroform, carbolic acid, cocaine, menthol) possess any anæsthetic properties when applied to the unbroken skin (ethyl chloride, which freezes the skin, is the single exception to this generalization). Veley and Symes (14) discuss the physical properties of stovain and its homologues, and report investigations of their effects on contractility of isolated muscle, blood pressure, respiration, and nerve conductivity. On the central nervous system and circulation Fourneau's new salt is less active and methyl stovain at least no

more active than stovain. Amyl stovain is less active on the nervous system and its depressant effect on circulation is greater and more gradual. Tested by the effect on conductivity of frog's nerve, stovain and its homologues are more active local anæsthetics than is cocain. Examination of the anæsthetic block in individual nerve fibers indicates that the amplitude of a muscle twitch depends on the number of fibers involved. Judged by muscular response the anæsthetic block in individual nerve fibers to impulses evoked by maximal stimuli, throughout a wide range of intensity, is complete or zero.

From an analysis of cutaneous sensations as influenced by ethyl chloride Franz and Ruediger (1) are led to conclude that the hairs possess two distinct sensory end-organs, the one concerned with sensations produced when the hair is brushed lightly, the other concerned with sensations resembling pain and pressure, and resulting from traction of the hair. In the case of the temperature sensations no such normal dissociation was found. Differences in the rate of recovery of sensibility are relied on in making these analyses. Raimann (11) distinguishes between specific and purely individual reactions to drugs, from the point of view of their effects on consciousness, and raises the question whether all psychopathological phenomena are not toxic in the long run. Isserlin (8) seeks to defend Kraepelin's work on the effects of alcohol on the capacity for work. The article is a reply to criticisms of Moll and is purely controversial in character. Jacobson (9) reports observations made during a 15-minute nitrous oxide anæsthesia and discusses recent papers of a similar sort. He finds reason to believe that the "higher" functions (intellection) may persist for some time after "lower" functions, such as vision, have failed. Consciousness is reported as having been present at the very moment of the operation in the interest of which the anæsthetic was taken. Langfeld (10) reports experiments to determine the influence of caffein on "suppression with negative instruction." The effect was found to be an acceleration of the association reaction time with no deterioration of inhibition.

Hollingworth (3, 4, 5, 6 and 7) reports experiments on the influence of caffein on mental and motor performance in typical tests (tapping, steadiness, coördination, perception, association, discrimination, calculation, cancellation, typewriting, quality and amount of sleep, general health, weight, etc.). Attention may be called to the attempt to develop a rigorous experimental tech-



nique and a standardized series of tests for future work in this field. Points of method and the respective merits of the various sorts of tests are contained in the complete report (6). The experimental results are summarized in a schematic table which is reproduced here.<sup>1</sup>

THE INFLUENCE OF CAFFEIN (HOLLINGWORTH)

St.—Stimulation. O—No Effect. Ret.—Retardation.

Process	Tests	Primary Effect			Secondary Reaction	Action Time in Hours	Duration in Hours
		Small Doses	Medium Doses	Large Doses			
Motor Speed	Tapping	St.	St.	St.	None	.75-1.5	2-4
Coördination	Three Hole Typewriting	St.	O	Ret.	None	1-1.5	3-4
	(a) Speed (b) Errors	St. Fewer for all doses.	O	Ret.	None None	Results show only in total day's work.	
Association..	Color-naming	St.	St.	St.	None	2-2.5	3-4
	Opposites	St.	St.	St.	None	2.5-3	Next day
	Calculation	St.	St.	St.	None	2.5	Next day
Choice.....	Discrimination	Ret.	O	St.	None	2-4	Next day
	Reaction time	Ret.	?	St.	None	3-5	No data
	Cancellation	O	O	O			
General.....	S-W Illusion						
	Steadiness	?	Unsteadiness		None	1-3	3-4
	Sleep Quality	Individual differences, depending on body weight, time of administration, presence of food substance in the stomach, etc. No correlation with age, sex, or previous caffein habits.					
	Sleep Quantity						
	General Health						

Robinson (12), in a 16,000-word dithyrambic essay considers hasheesh "from the historic, botanic, microscopic, chemic, physiologic, therapeutic, pharmacologic" and psychological viewpoints, and contributes a sonnet to the drug. The "experiments" consisted chiefly in administering hasheesh to individuals, whose subsequent behavior, conversation, and general impressions are recorded. Two subjects give retrospective accounts of the subjective features of hasheesh intoxication. Principal psychological results: There is no record of a fatal dose; idiosyncrasy is important; the drug is a powerful narcotic, producing euphoria, erotic visions, superficial associations, disturbance of time sense; tendencies to dissociation are also reported.

<sup>1</sup> See also p. 418.

## REFERENCES

1. FRANZ, S. I., and RUEDIGER, W. C. Sensory Changes in the Skin Following the Application of Local Anæsthetics and Other Agents.—I. Ethyl Chloride. *Amer. J. of Physiol.*, 1910, 27, 45-59. *Bull. Gov. Hosp. for Insane*, 1911, 3, 15-26.
2. HIRSCHL, G. Fortschritte auf dem Gebiete der Lokalanästhesie. *Med. Klin.*, 1911, 7, 1721-1724.
3. HOLLINGWORTH, H. L. The Influence of Caffein on Performance in Typewriting. *PSYCHOL. REV.*, 1912, 19, 66-73.
4. HOLLINGWORTH, H. L. Influence of Caffein on Quality and Amount of Sleep. *Amer. J. of Psychol.*, 1912, 23, 89-100.
5. HOLLINGWORTH, H. L. Influence of Caffein on Efficiency. *Therap. Gaz.*, January 15, 1912. Pp. 16.
6. HOLLINGWORTH, H. L. *The Influence of Caffein on Mental and Motor Efficiency.* (Archives of Psychology, No. 22.) The Science Press, Sub-station 84, New York City. Pp. 167. \$1.75 (cloth).
7. HOLLINGWORTH, H. L. Experimental Psychology and the Question of Public Health. *Ariz. J. of Educ.*, 1912, 3, 11-14.
8. ISSERLIN, M. Kraepelin's Experimente mit kleinen Alkohol-dosen. *Zsch. f. d. ges. Neur. u. Psychiat.*, 1911, 6, 589-604.
9. JACOBSON, E. Consciousness under Anæsthetics. *Amer. J. of Psychol.*, 1911, 22, 333-345.
10. LANGFELD, H. S. Suppression with Negative Instruction. *PSYCHOL. REV.*, 1911, 18, 411-424.
11. RAIMANN, E. Bewusstsein und Intoxikation. *Ber. IV. Kong. f. exper. Psychol.*, 1911, 242.
12. ROBINSON, V. *An Essay on Hasheesh, including observations and experiments.* New York: Medical Review of Reviews, 1912. Pp. 83. \$0.50.
13. SHORT and SALISBURY. The Action of Cutaneous Anæsthetics. *Brit. Med. J.*, 1910, 1, 560-563.
14. VELEY, V. H., and SYMES, W. L. Certain Physical and Physiological Properties of Stovain and its Homologues. *Proc. Roy. Soc.*, 1911, B83, 413-420; 421-432.

## SPECIAL REVIEWS

### INDIVIDUAL PSYCHOLOGY

*Henri Poincaré.* Dr. E. TOULOUSE. (Enquête médico-psychologique sur la supériorité intellectuelle. Tome II.) Paris: Flammarion, 1910. Pp. 204.

This book is one of a series of studies, the purpose of which is to investigate, by the clinical method, the relation between intellectual superiority and neuropathy. The plan is to proceed, without prejudice, by testing several superior men by experimental methods, in order to determine their physical and mental characteristics. It is hoped that in this way some light may be thrown on the psychological conditions of genius. Toulouse has already reported (1896) such a study of Zola.

Zola's type was found to be characterized by prominent voluntary intellectual activity, clearly conscious, capable of intense, concentrated effort, with no tendency to perseveration after cessation. His thought, as disclosed by the tests, was logical, methodical, and seemed preëminently fit for the work of mathematical deduction. The surprising thing was that such a type should have become the prince of romance that Zola turned out to be. The tests of Poincaré show him to present a striking contrast with Zola. His mental processes were shown to be flighty, uncontrolled, and spontaneous; his attention instable and easily distracted; his performance irregular and spasmodic, disclosing an evident neuropathic basis,—apparently a type preëminently fitted for romance, but finding its outlet in severe mathematical and philosophical creation.

The tests (which were made thirteen years before their publication) followed a technique which the author now recognizes to have been quite imperfect and fragmentary, but they are said to have yielded results quite sufficient to characterize the intellectual type of the man. The investigation took account of the special topics of heredity, development, physical condition, sensory acuity, various kinds of memory, attention, imagery, reaction time, association of ideas, language and handwriting, character, habits, opinions. The account of the tests is followed by a synthesis in which is attempted a general picture of Poincaré's type, and an interpretation of the conditions of invention and speculative genius.

The biographical sketch is meager and the attempts to trace far-reaching effects of minor juvenile events are anything but convincing, although they are of course offered only as suggestions. Poincaré resembled most his mother and grandmother, who, with collateral relatives, are said to have shown special aptitude for mathematical calculations. Several male members of the family have had successful careers in neurology, meteorology, law, politics and mathematics. There are traces of arthritic and rheumatic heredity.

Poincaré's development was not precocious, although he was bright and showed, when quite young, mathematical ability of an unusual order. His history, up to the age of 30 years, at which time he was elected to the Academy of Sciences, was not unlike that of many other mathematicians whose freedom from the necessity of experiment allows them to make rapid progress. He was at one time troubled by rheumatism, and in his childhood suffered from a serious attack of diphtheria, followed by paralysis. This attack is said to have profoundly modified his nervous system, perhaps providing the neuropathic basis for traits shown in later life,—such as awkwardness, restlessness, flighty attention, distraction and general sensori-motor deficiency.

The physical examination, anthropometric measurements, and strength tests, along with the inquiry into habits of eating, sleeping, and the use of narcotics, revealed nothing very unusual. Poincaré had head measurements somewhat larger than the average. He was troubled with indigestion, did not use tobacco, used wine and coffee only sparingly, and was troubled with insomnia. He was able to work for but four hours a day, in two-hour periods, and the tendency to automatisms and perseveration of psychic activity compelled him to cease work for some time before retiring. He disliked muscular exercise except for the automatic processes involved in walking. His absent-mindedness was a matter of common comment.

The eye and ear examination are said to have shown Poincaré to have been "rather feeble from a sensory point of view," although the defects found do not strike the reader as being at all unusual. Hearing was defective for low tones; orientation and localization fair. There was myopia but no astigmatism, and campimetry tests showed no abnormality. Muscular weakness was found, which led to accommodation spasms. Poincaré had no visual images or memories, except in the transition state between waking and sleep-

ing, when he had frequent visual hallucinations of remarkable distinctness. In his waking life he relied on motor images and tendencies, thinking of geometrical forms in terms of optical or manual movements. He had no visual "schemes," but represented time by a rotation of the eyes on their axes. In his youth he had pronounced colored hearing, which was evoked not by the form but by the sound of the letters. In the case of the vowels three of the letters corresponded to the average found by Flournoy and Claparède, who finds one out of seven people to have this colored hearing. Poincaré had no other synæsthesias. His movements were characterized by uncertainty, irregularity, awkwardness and hesitancy, and muscular reflexes were prominent.

Tests of recognition memory for the length of lines (a total of only 14 different trials on 6 different standards) showed large errors in the case of one line, and this is taken to be significant of vacillating attention. On the basis of these few trials Poincaré is compared with Zola and with Dalou, who made similar trials. In the case of reproductive memory a total of 15 trials on 5 different standards is taken to afford sufficient evidence that with Poincaré reproductive memory was poorer than recognition memory. A few attempts at reproducing drawings exposed for 5 seconds are said to have shown exceptional capacity in this respect, but the tests were fragmentary and uncontrolled. The memories were held with the aid of motor imagery, and the reproduction was often not from the image but on the basis of an analysis of the material.

Poincaré's memory span for digits was about 11 (as compared with the ordinary record of 7 or 8). He had an auditory span for letters of about 9 and a visual span of about 7. Brute memory (as in the cases of Zola and Dalou as well) did not seem to be particularly good. Much emphasis is laid on Poincaré's tendency to use memory devices in remembering this non-logical material,—he employed analysis and incidental schemes whenever possible. He had "a remarkable facility in mental calculation" which is said not to be the rule with mathematicians.

In logical memory Poincaré was superior to both Zola and Dalou, and in the case of logical material his memory is again seen to be analytical and artificial rather than brute,—all material was placed in a coherent system, and it was the system rather than the material which was remembered. This tendency to organize is said to be a result rather than a cause of Poincaré's high order of intelligence.



The cancellation and reaction time tests lacked standardization and mean nothing as they stand. The simple sensory reactions are said to have been slower and more regular than those of the average person, but the motor reactions much quicker. This accords with the previous statements as to his general motor type. The most significant thing about the reactions is said to be the wandering and instable attention which they disclosed. It was difficult to keep Poincaré's mind on the tests, because his attention constantly wandered to the apparatus. In receiving instructions for such experiments Poincaré did not seem to comprehend what was being said, but appeared distracted and uninterested. He is said to have given the same impression to those whom he met in his daily relations. He was restless, could not remain lying in one position or stay by one task, had no patience and abandoned his work whenever it seemed to require any voluntary effort.

Tests of reverie associations and of free paired associates showed absence of voluntary attention and predominance of purely verbal association tendencies. (This conclusion is based on a single list of 12 words written at random, and on a single list of the same number of paired associates.) Binet's "cigarette description" test was used, and Poincaré found to belong to Binet's first type of observer (simple description, with no evidence of reflection or judgment, no display of erudition, no expression of fancy or sentiment). His description was remarkably lucid and clear.

Poincaré spoke correctly, never learned his addresses by heart, and made few corrections either in writing or in speaking. Indications of his temperament and type are said to be revealed in his handwriting.

Poincaré's opinions on various topics are given and several peculiar habits of daily life enumerated, chiefly for the sake of emphasizing his constant air of distraction, his impatience and restlessness. He loved music, sketched a little, did not sleep soundly, and often began to work on a problem only to abandon it in the faith that it would somehow solve itself unconsciously or that the right idea would come spontaneously on a later occasion. He often began a memoir without having his conclusion in mind, or even the development of the problem. He often wrote formulæ automatically for the sake of the chance associations which they might bring. Quite in contrast with Zola, when he met with a difficulty or with a point requiring voluntary effort, he abandoned his work or proceeded to another part of it which would develop more spontaneously.

Poincaré's genius is thus said to be incapable of explanation on the basis of his sensori-motor equipment, his memory, or the speed or control of his psychic activity. But his tendency to distraction, automatisms, oscillating attention, restlessness, uncontrolled associations, his reliance on chance syntheses and spontaneous ideas are held to be significant for the type of genius required for mathematical and philosophical speculation. In Poincaré's case they seem to have constituted a definite method of research. His intellectual activity was, above all, spontaneous and automatic.

These traits may be supposed to have rested on a more or less definite neuropathic basis. In extreme forms these distractions, the flights of attention and ideas, the automatisms and the verbal associations, the perseverations, etc., appear in marked forms of idiocy and insanity. When not extreme and when directed by some special aptitude (such as a congenital mathematical bent) they seem to be the condition of such creative and inventive genius as Poincaré possessed. Inventive genius is characterized by creation, and creation is a spontaneous activity or coördination which may be given direction by some dominant interest or aptitude. Genius is related to insanity chiefly by virtue of the common characteristic of instable attention and spontaneous ideas and associations. "There is but one psychology; its laws are common to an imbecile and to an Aristotle."

In evaluating this study it is not necessary to emphasize unduly the question propounded in its preface,—“Is genius a neurosis?” Its chief value seems to the reviewer to lie in the fact that it is an interesting attempt to study in a more or less intimate and intensive way the psychological processes and type of an individual of marked achievement. It is much to be regretted that the experimental technique was not more systematically elaborated and standardized, for in these days of interest in mental tests it would be valuable to know the ways in which such admittedly superior individuals as those enumerated by Toulouse,—Zola, Berthelot, Dalou, Rodin, Puvis de Chavannes, Saint-Saëns, Edmond de Goncourt, Daudet, Lemaître, Loti and Mallarmé, differing as they do in their types of achievement, would react to the simple tests now employed by those interested in the measurement of intelligence.

Some of us are inclined to believe that these tests, which are at best tests of capacity only, will never be able to throw much light on the individual's probable performance in competitive life. The concrete psychological life depends as much on motive as it does on

capacity, and the degree to which motive and capacity sustain each other is a difficult thing to measure under laboratory conditions. It is to be hoped that Dr. Toulouse will utilize the improvements in technique presented in his recent experimental manual or in other test series of a similar kind in giving us more of these intimate and intensive psychological biographies.

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### APPLIED PSYCHOLOGY

*Increasing Human Efficiency in Business.* WALTER DILL SCOTT.  
New York: The Macmillan Company, 1911. Pp. 331. \$1.25 net.

Business men are commencing to look to psychology as a possible assistance in their affairs. Only a few years ago any reference they might make to it was of a derogatory character. But their conception of the nature of psychology and of its possible applications has undergone an enormous change. Today there are constant references to psychological theories in all of the business and advertising journals. Some of these, indeed, still frankly oppose the idea that there is anything of practical value to be found in a so-called "academic study," but such writers are among the minority.

The writer of the book before me is one of the first psychologists to write for the business world. Today, he is known to nearly every advertising man in the country. To him is due much of the credit for the changed attitude toward psychology which has just been pointed out.

His first two books dealt with the application of psychology to advertising, his third with salesmanship and this, his fourth book, is concerned with the problems of the business executive. In this he has taken up such general psychological terms as "imitation," "pleasure," "loyalty," "relaxation," etc., and devoted a chapter to each. General principles are stated and each is illustrated by many concrete examples. The last four chapters deal mainly with "habit formation." Several practice curves of his own and of other investigators are given and the chief principles to be deduced from them are stated.

The book contains nothing new to the psychologist. It was not written, however, for him, but for the business man. Technicalities are largely eliminated and the whole work is mainly inspirational

and suggestive in character. It should, however, be useful to the psychologist as auxiliary reading in general courses, as it gives large opportunity for the application of general principles to concrete cases.

The reviewer wishes that the book had contained some reference to the recent work on "fatigue," "optimum working periods," etc. The steady increase in output per worker in present-day business is developing a new problem for careful study. We need to know what are the limits within which a worker may increase his productivity without becoming liable to disastrous "after-effects." To have discussed the subject of "relaxation" and "competition" and not to recognize that there is danger from overwork (aside from "worry," which apparently can be eliminated) is a serious defect to my mind. Psychology has much in store for the business world in teaching better methods of work, but it will not have done its duty until it has also pointed out the limits to the length and speed of work which cannot be exceeded without permanent injury to the worker.

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### ÆSTHETICS

*Beauty and Ugliness and Other Studies in Psychological Æsthetics.*

VERNON LEE and C. ANSTRUTHER-THOMSON. London and New York: John Lane Company, 1912. Pp. ix + 376.

The five studies making up this volume begin with an essay on "Anthropomorphic Æsthetics" having for its theme that "the discovery of this projection of our inner experience into the forms which we see and realize is the central discovery of modern æsthetics." The second paper "Æsthetic Empathy and its Organic Accompaniments" is a translation from Vernon Lee's original French in the *Revue Philosophique* for 1907. The third "The Central Problem of Æsthetics" has appeared in the *Zeitschrift für Aesthetik*, 1910, and the fourth "Beauty and Ugliness" is reprinted from the *Contemporary Review* of 1897. The fifth study entitled "Æsthetic Responsiveness" is a series of extracts from Vernon Lee's gallery diaries from 1901 to 1904. These observations upon her æsthetic reactions to various works of art were noted down in the galleries or within twenty-four hours of the time of observation. They have not been worked over into essay form "because,"

the author writes, "I wanted to place my materials unspoilt at the disposal of other students."

The chief point of theoretical interest in the book is the modification, by Lee, of the theory put forth in the early essay on Beauty and Ugliness. It will be remembered that in that essay the authors based their theory of empathy (though it was not then called by that name) upon the James-Lange theory of emotion, and explained the æsthetic enjoyment of visible beauty as a function of the physiological changes—circulation, respiration, imitative muscular adjustments, etc.—occasioned by the view of the object, and felt by the observer as a mass of sensory data. Vernon Lee is now inclined to believe that it is not necessary always to have actual sensory experience of these processes during æsthetic empathy. She holds, rather, that with some observers the attribution to the object of one's own condition takes place in terms of mental imagery—especially kinæsthetic imagery—instead of present sensational experience.

One purpose of the book is to stimulate experimental psychologists to the study of æsthetic appreciation for visual form. Much more, however, has been done in this field, particularly in America, than the author seems to recognize.

It is important for students of æsthetics to have the writings of Lee and Thomson on this subject gathered into a book. And a new and real contribution has been made in the mass of introspective records from the gallery notes.

The book is agreeably printed and contains nine attractive plates.

KATE GORDON

LOS ANGELES

#### ANTHROPOLOGY

*Psyche's Task. A Discourse concerning the Influence of Superstition on the Growth of Institutions.* J. G. FRAZER. London: Macmillan, 1909. Pp. 84.

Any one who values his time is likely to eye Frazer's recent extensive works with the wish that several volumes might be transfigured in some non-Euclidean way into the dimensions of an hour's reading. This of course cannot be done, for their method is essentially anecdotal, and any attempt to reduce their extent would result in elimination and not in condensation. Nevertheless, in *Psyche's Task*, under an obscuring title and without professing to do so, Dr. Frazer has epitomized for us a train of thought which



permeates and perhaps dominates all his writings. The discourse is dedicated to "all who are engaged in Psyche's task of sorting out the seeds of good from the seeds of evil." To such seriously intending persons the author of the *Golden Bough* presents a carefully selected group of characteristic anthropological anecdotes by which he proposes "to prove, or at least make probable, that among certain races and at certain stages of evolution, some social institutions which we all, or most of us, believe to be beneficial, have partially rested on a basis of superstition." Some justification for such a multitude of saving clauses will be granted when we find that the institutions in question are civil government, private property, marriage, and the secure enjoyment of human life.

It would be distinctly unfair to give the impression that the author rests these institutions entirely upon a basis of superstition, or that he praises superstition. And yet the reviewer, compelled as he is to believe that there is a meaning in the discourse, retains the impression that there is a dilemma implied which is none the less convincing for not being expressed. The author seems to mean that either these institutions lack a good deal of the sanctity which some of the unthinking of us incline to attach to them, or else superstition is sanctified by its parental relation to them.

In the case of civil government superstition has worked mostly through the taboo, placing a hedge of sanctity around the personal head of the government. The supposed sanctity of the chief is his principal or only means of enforcing his orders. This sanctity extends to his belongings, and we have accounts, of psychological interest, of persons who have died after learning that they had inadvertently used the king's lost tinder-box or eaten the remains of his dinner. Because of his sanctity and of his relations with spirits there is often ascribed to the king power over the rains and the fruitfulness of the soil; and then the author, with no visible smile in the printed page, proceeds to say that in Africa "droughts or famine are set down to the weakness or ill-will of the king and accordingly he is punished, or deposed, or put to death." After that we are told in conclusion that "many peoples have regarded their rulers, whether chiefs or kings, with superstitious awe as being of a higher order and endowed with mightier powers than common folk. Imbued with such a profound veneration for their governors and with such an exaggerated conception of their power, they cannot but have yielded them a prompter and more explicit obedience than if they had known them to be mere men just like

themselves." This proves the value of superstition as a foundation of government.

With regard to private property the case is simple. Almost universally primitive and other peoples have relied upon one another's superstitious fears to secure themselves in the possession of whatever they have acquired. Taboo, magic, the imprecations of the owner, all impress the covetous with the dangers of stealing. It is not impertinent to remark however that our author calls attention later on to the enormous waste and destruction of property for which superstition is responsible. If superstition is conservative of private property rights, it is not conserving of property in general; the destruction of property in connection with funerals is an instance of waste directly due to superstition and to that alone.

Marriage, or the tribal code of sexual relations, is protected by a great number and variety of superstitious sanctions. Breaches of the marriage laws are generally believed to affect the community as a whole, causing public calamities such as droughts. "Wherever these superstitions prevail it is obvious that public opinion and public justice will treat sexual offences with far greater severity than is meted out to them by peoples who, like most civilized nations, regard such misdemeanors as matters of private rather than public concern. . . . And conversely, wherever we find that incest, adultery, and fornication are treated by the community with extreme rigor, we may reasonably infer that the original motive for such treatment was superstition." The question why various peoples come to regard certain relations of the sexes as immoral is mentioned and left unanswered, but the connection between disorders of nature and disorderly sexual relations is traced to the belief that a connection exists between reproduction in nature and reproduction in man; men mimicking or recapitulating the processes of nature exercise a magical influence over them.

Finally superstition, notably the fear of ghosts, has sanctified human life. In this section the argument, if there is any, is exceedingly obscure, and seems to the present writer quite inconclusive. To be sure there is evidence that murderers are made uncomfortable under the system of quarantine by which the community seeks to protect itself from the evil spirits who dog the heels of man-slayers. But there is no evidence of any such fatal results to the murderer as those which overtake the petty thief or those who trespass upon the king's prerogatives. The ghosts of the slain are less discriminating in their vengeance than the spirits who maintain the taboo.

"Indeed the ghosts of all who have died a violent death are in a sense a public danger; for their temper is naturally soured and they are apt to fall foul of the first person they meet without nicely discriminating between the innocent and the guilty." Out of a varied array of ceremonies having to do with the protection of the living from the spirits of the dead there is not one item which indicates that the primitive mind recognizes any difference between the dead who have been respectfully treated before their death and the victims of human violence; all the dead are equally dreaded, no matter how they came by their death. The most cruel of the social punishments which are mentioned are not those accorded to murderers but to innocent widowers. "His miseries begin with his wife's death. He is immediately stripped of all his ornaments, abused and beaten by his wife's relations; his house is pillaged, his gardens devastated. . . . He may not hunt or fish with the others, his presence would bring misfortune; the spirit of his dead wife would frighten the fish or game. . . . If he were dead he could not be ignored more completely. He has become a nocturnal animal. He is forbidden to show himself in public, to traverse the village, to walk in the roads and paths." Is it the author's naiveté or a sly malice that lets him introduce as an evidence of the influence of superstition in increasing the respect for human life the Fijian custom of forestalling subsequent spirit activities by burying the aged and sick alive? A more forceful, if less trustworthy, report is presented in the case of the Chinese, whose reverence for the spirits of the dead is said to increase their respect for the aged and helpless, and who are said also to resort to suicide in order to free themselves from the limitations of the body and so as ghosts to torment those who have injured them.

Having shown that superstition has been helpful in developing government, private property, marriage, and respect for human life, the discourse closes by insisting that right action is more valuable than right opinion, and that we should not be blind to "the benefit which superstition has conferred on society by furnishing the ignorant, the weak, and the foolish with a motive, bad though it be, for good conduct." To what extent government, private property, marriage, and respect for human life still rest upon superstition the reader is left to guess for himself.

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## THE ASSOCIATION EXPERIMENT

*Untersuchungen über die Konstanz und den Wechsel der psychologischen Konstellation bei Normalen und Frühdeementen (Schizophrenen).*

W. PFENNINGER. *Jahr. f. psychoanal. u. psychopathol. Forsch.*, 1912, 481-524.

*Experimentelle Beiträge zur Psychologie des psycho-galvanischen Phänomens.* ESTHER APTEKMANN. *Ibid.*, 591-620.

The outlook upon the association experiment is broadened several degrees by these two studies, which are the same in make-up and general viewpoint. In the first and longer of the two, the same association experiment of 100 words was repeated with 8 normal subjects, 4 men and 4 women, eight times at weekly intervals; a similar procedure was carried out with 11 cases of dementia præcox, 6 men and 5 women. The reaction times of the women begin about a third longer than those of the men, decrease more regularly, and end somewhat shorter. The tendency to change the response-words is somewhat more pronounced in the men than in the women subjects, and progressively decreases in both; more rapidly with the men at the end, in the women at the beginning. *Komplexmerkmale* are pronouncedly more frequent in the women, and do not decrease in the later series so much as those of the men. The changed responses show through all series somewhat longer reaction times than those which are not changed. In the relation of the *Komplexmerkmale* to the tendency to change responses, those without *Komplexmerkmale* are changed much less than those with them, but in the detail of the latter there is a complicated sex difference, which the author endeavors to interpret. The stimulus words are characterized in the earliest series by more *Komplexmerkmale*, the more change they are to show. Those associations which are inconstant attach to the more emotional constellations. Associations which are later to change also have longer time in the first and second repetition. The author seems also to believe that there is a significant tendency for the time of an association to be longer if it is to show a change in the next repetition. In the later repetitions, the changed responses concentrate themselves upon stimulus words which have also given rise to earlier change, *i. e.*, certain stimulus words show throughout special liability to changed responses. These associations are apt to be grouped (*Störungsketten*) with evidences of perseverative phenomena.

The reaction times average some three to four fold longer in

the pathological cases, and the difference between the men and women is, except at first, more marked than in the normal. (Initially the reaction time of the women averages shorter than that of the men.) The course of the reaction times through the eight repetitions is much changed, and: the curve of the dementia præcox men corresponds closer to that of the normal women, that of the dementia præcox women to the normal men. Further, a similar series of experiments with six women subjects, by a woman experimenter, gave now a result similar to the previous one of the man experimenter with the men dementia præcox subjects. Other results point in the same direction; e. g., the number of *Komplexmerkmale*, while as previously more frequent in the women throughout (and in both much increased), shows in the curve of decrease rather the reversed relationship of the men and women subjects from that found in the normal. Again the woman experimenter finds with women dementia præcox subjects the same result as the man experimenter with the men dementia præcox subjects. These seem very suggestive findings. The responses are changed much more frequently in the dementia præcox than in the normal subjects; the sex relationship is indeterminate and is not altered in the time relations of the changed and unchanged responses.

The second paper deals with normal subjects only, adding some material on the psychogalvanic reflex. This is from some early work by Jung and Brill, with a very simple technique. Association series of the same 50 or 25 stimulus words were given respectively 6 times weekly and 7 times daily to groups of 4 and 5 subjects. A heightened reaction time in the fourth experiment, noted in Pfenninger's men subjects, is seen here also, and a corresponding phenomenon appears again in the galvanic reactions; the authors talk of homosexual resistances. As with Pfenninger the number of changed responses decreases with repetition, and there is less change in the daily series than in the weekly. Changed responses have longer times, and are more associated with *Komplexmerkmale* than unchanged ones, as we should expect. Also the galvanic reactions show, in their relation to these phenomena, about what our knowledge of this method would lead us to anticipate. The deflections tend to drop in the later series, though not always in correspondence with the association time. Deflections above the median are also associated with greater change in response than those below it; in a greater degree than the change is related to the remaining *Komplexmerkmale*.



The reviewer, and doubtless others, have noted the possibility of associative responses being influenced by the personality of the experimenter.<sup>1</sup> The result of Morawitz's contribution to Pfenninger's article is in conformity with this idea, and Aptekmann tests it out somewhat further. Experiments were made by Jung and the author, with six men and six women subjects. The differences are often too small for significance, but in a special experimental series the women subjects show a rather constant deflection with the woman experimenter, much greater and decreasing deflections with the man experimenter. The men subjects show with the man experimenter about the same result as the women, with the woman experimenter much smaller deflections, slightly decreasing. Beyond the general decrease with repetition there is nothing of certain significance in the association times. Detailed examination seems to the author to reflect the greater prominence of sexual factors in the experiment with opposite sex, of the economic one in the others. The two sets were not with the same stimulus words. Words which begin with a high deflection tend to preserve this superiority in repetition. Differences may be shown in the personal influence of various experimenters on the results. The author considers that in the present instance other factors outweigh the sex difference; the point is well taken that the experiment here becomes a measure of the experimenter as well as the subject.

Dealing with the responses by classification in quasi-logical categories seems to have been abandoned by Jung's pupils. This method is essentially a criterion of personal association type, and in Pfenninger's problem would not have made so much difference; but something of the sort should probably have been attempted in Aptekmann's research, with a simplification of the original Jung-Riklin categories. That no generalizations on the effect of sex differences in the experimenter should be made on the basis of one experimenter of each sex, seems as clear to the author as to the reviewer.

A broader criticism to be made of these two papers is one that applies to much of the work from their common source. There seems to be no adequate conception of the significance of variability. In a school that makes so much of individual psychology, it is the more regrettable that individual differences should be all but ignored in a study whose material must contain much of value for their understanding. The authors like to deal with their averages without statement of deviations as though every member of the group had shown

<sup>1</sup> *PSYCH. REV.*, 1911, 18, 6-7. *PSYCHOL. MONOG.*, 1911, 13, No. 57, p. 79.

the same measure. As a result, it often happens that the authors strain every neurofibril for the uniform psychological interpretation of some phenomenon whose factual validity is far from established in the given results. Psychoanalysis has an excellent *Problemstellung* but its methods as yet lack sense of proportion; psychoanalysts seek the road to knowledge with a good compass, but an execrable map.

While then it seems very plain that the presentation of the results could have been improved upon, experimental practice in psychoanalytic envisagement should be in every way encouraged, that the more doubtful theories associated with the method may be submitted to proper objective test.

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#### A CORRECTION

TO THE EDITOR OF THE PSYCHOLOGICAL BULLETIN:

Mr. F. S. Breed has called to my attention the fact that a criticism suggested in my review of his monograph, "The Development of Certain Instincts and Habits in Chicks" (see the August number of the BULLETIN), was forestalled by him in the work reviewed. I suggested that in the experiments which he describes, where a chick rejected blue when that color was offered with black and also when it was offered with white, there might have been identification of the absolute brightness of the blue, which would thus have been seen not as a color but as a grey. Mr. Breed however says on page 69: "It may be suggested that after the long period of training the chicks respond to a particular brightness value, the blue amounting to certain degree of grey. But No. 32 and No. 33 rejected blue (tint No. 1) when it was used in combination with the much brighter yellow." I am glad to take this opportunity of apologizing for the carelessness shown in overlooking the fact that more than one saturation grade of blue was used in these experiments, a fact which decidedly strengthens the case for color discrimination.

MARGARET FLOY WASHBURN

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# BOOKS RECEIVED DURING OCTOBER

- LEUBA, J. H. *A Psychological Study of Religion*. New York: Macmillan, 1912. Pp. xiv+371. \$2.
- WATSON, J. *The Interpretation of Religious Experience*. 2 vols. Glasgow: Maclehose & Sons, 1912. Pp. xiv+375, x+342. \$6.
- MORGAN, C. L. *Instinct and Experience*. New York: Macmillan, 1912. Pp. xvii+299. \$1.25.
- HÖFFDING, H. *A Brief History of Modern Philosophy*. (Trans. fr. German by SANDERS, C. F.) New York: Macmillan, 1912. Pp. x+324. \$1.25.
- CALKINS, M. W. *A First Book in Psychology*. (3d rev. ed.) New York: Macmillan, 1912. Pp. xix+426. \$1.90.
- CALKINS, M. W. *The Persistent Problems of Philosophy*. (3d rev. edition.) New York: Macmillan, 1912. Pp. xxvi+577. \$2.50.
- HELLER, T. *Grundriss der Heilpädagogik*. (2. umgearb. u verm. Aufl.) Leipzig: Engelmann, 1912. Pp. xi+676. Mk. 17, Geb. 18.
- ELSENHANS, T. *Lehrbuch der Psychologie*. Tübingen: Mohr (Paul Siebeck), 1912. Pp. xxiii+434. Mk. 15.
- POFFENBERGER, A. T. *Reaction Time to Retinal Stimulation, with Special Reference to the Time Lost in Conduction through Nerve Centers*. (No. 23 of Archives of Psychology.) New York: The Science Press, 1912. Pp. iii+73.
- CULLER, A. J. *Interference and Adaptability. An Experimental Study of their Relation, with Special Reference to Individual Differences*. (No. 24 of Archives of Psychology.) New York: The Science Press, 1912. Pp. v+80.
- TODD, J. W. *Reaction to Multiple Stimuli*. (No. 25 of Archives of Psychology.) New York: The Science Press, 1912. Pp. iii+65.
- MARTIN, L. J. *Die Projektionsmethode und die Lokalisation visueller und anderer Vorstellungsbilder*. Leipzig: Barth, 1912. Pp. 231.

## NOTES AND NEWS

DR. E. B. TITCHENER, Sage professor of psychology in the Graduate School of Cornell University, has been appointed head of the combined undergraduate and graduate sections of the department of psychology and lecturer in psychology in the College of Arts and Sciences. In the latter position Professor Titchener will give lectures in elementary psychology. In connection with the changes mentioned it is significant to note the retention of the professorship in the Graduate School.

SAMUEL W. FERNBERGER, PH.D. (Pennsylvania), succeeds Dr. Harry P. Weld as instructor in experimental psychology at Clark University.

T. H. HAINES, professor of psychology in the Ohio State University, is on leave of absence for the present year. Professor Haines plans to spend the year in visiting a number of European psychopathological institutes.

DR. C. E. FERREE, of Bryn Mawr College, has been advanced to an associate professorship of experimental psychology. A separate building has been granted him by the College to be used exclusively as a graduate laboratory of experimental psychology. This building will be fitted up for research work alone and will, when finished, consist of eight rooms. One or more optics rooms will be provided, furnished with sky-lights, diffusion sashes, etc., for the control of illumination, and with concrete piers running to the ground to give a vibrationless support for delicate apparatus. The regular services of a mechanician will be available for this laboratory.

PROFESSOR E. A. KIRKPATRICK, of the State Normal School, Fitchburg, Massachusetts, would be glad to receive letters from all those who would care to have a series of photographs, similar to those issued by the Open Court Publishing Company, of present-day psychologists, educators, and men of science. Suggestions concerning the photographs which should be placed in such a collection would be welcomed by him, and the amount of interest in the matter indicated by the communications received will determine whether it is feasible to undertake the task of collecting and publishing.

